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ABSTRACT

A study examined the general achievement and aptitude of prospective teachers at the University of Minnesota's College of Education. Test scores were examined over time, against majors in other professional schools in the same institution, as well as across different education majors. The specific variables investigated included subtests of the Preliminary Scholastic Aptitude Test (PSAT), subtests of the American College Test (ACT), cumulative grade point average, and high school rank. On the average, education students at the university scored higher on the standardized tests than did other students across the state and the country. When they were compared with other majors at the university, the education students typically scored the lowest. However, when only academic education majors were compared with other majors, they tended to score as high or higher. The only statistically significant difference found over time was on the verbal aptitude score of the PSAT, a slight decrease shared by all majors. (Author/CJB)

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Assessment of Aptitude and Achievement of Education Majors

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Introduction

Concern about the relative competence of those planning to become teachers is widespread, and data sets used to support the common contention of growing incompetence are familiar. Weaver's (1978) study is widely quoted. His study revealed that the decline in Scholastic Aptitude Test (SAT) scores of freshmen elementary majors clearly exceeded declines in means nationally for other majors. He found that in 1970-71 education students' average SAT verbal scores (472) surpassed the aggregate average of other majors (455). The education majors' mean score for mathematical aptitude (506) similarly exceeded other majors (488) in 1970-71. By 1975-76, a dramatic reversal had occurred and the average scores of education students (417 verbal and 455 math) had not only diminished significantly but were now below the national means for other majors (431 verbal and 472 math). It should be noted that these figures were calculated on an examination of students in eight colleges.

The 1975-76 American College Testing Program reported an enrolled freshman profile for 1,138 institutions of higher education on the American College Test (ACT). The education students were ranked 14th on the English test and were tied for 17th on the math test among students in 19 fields of study. While questions can, of course, be raised about the extent to which such test scores are valid proxy measures of competence, the large scale Coleman study (1966) of schooling clearly showed that teachers' verbal ability was significantly correlated with verbal learning of students at all grade levels. In fact, Bowles and Levin (1968) in a secondary analysis of Coleman's data were able to establish a significant relationship between teachers' verbal aptitude and student general achievement.

Subsequent to Weaver's oft-cited study, two studies with similarly broad review were conducted on new teachers in North Carolina (Schlechty & Vance, 1981; Vance & Schlechty, 1982). In summarizing their findings, these investigators write:

> Our conclusions regarding the nature of recruits to teaching in the present decade are consistent with Weaver's findings. We found a consistent decline in the measured academic ability of teachers entering teaching in North Carolina during the period 1973-80. In our second study (Vance & Schlechty, 1982a) we found no reason to dispute Weaver's (1979) conclusions that the overall quality of those recruited to teaching in the 1970's (as measured by tests of academic ability) is probably lower than it was in the 1960's, though this conclusion is based more on Weaver's analysis than our own . . . . (p. 475)

Schlechty and Vance in their analyses uncover apparent reasons for the decline including the increased opportunities recently for academically able females. They illustrate this by reporting that:

> . . . 1,294 white females in 1973 scored below 610 (the 1973 median) and 1,301 scored above 610. Fourteen scored exactly 610. In contrast, 1,235 white females in 1980 scored below 610 and only 817 scored above 610. Ten scored exactly 610. Thus, while the number of white females employed (as teachers) declined overall from 1973 to 1980, most of this decline occurred among high-scoring females--that is, those scoring above 610. Indeed, in 1980, the state of North Carolina employed 484 fewer white females who scored above 610 in 1980 than in 1973. This is a 37% decline in the high-scoring white females employed in 1980 compared with 1973. (p. 475)

Not only are the more able less interested in teaching as a career, but the total number of individuals pursuing education has declined generally as 1983 data from the College Entrance Examination Board clearly show. Only 4.5% of all students registering for the SAT now pursue an education major, a diminishment of more than 50%. The mean scores for students indicating an education major on the SAT verbal in 1983 was 294,

29 points below the national average and a decline of 29 points in ten years. The math score (418) was now 48 points below the national average, having declined 31 points in the last decade.

Thus, there is little doubt that there have been sharp declines generally in standardized test scores as well as relative losses compared to other majors on prospective majors. The data to support the teacher competence concerns, however, tend to be either regional (Weaver, Vance, Schlechty) or national aggregates (The American College Testing Program, The College Entrance Examination Board). There has been little clarification through research and scant empirical evidence exists regarding (1) majors in certain regions of the country, (2) different types of institutions preparing teachers, (3) majors across single institution, or (4) different types of education majors. To address some of these gaps which exist in data sets about prospective teacher aptitude, two studies were designed with multiple measures to examine in detail the scores of teacher candidates in a major multiversity setting relative to other college majors over time in that same setting.

Data Collection

Study 1 was designed to assess the aptitude and achievement of College of Education students and to compare them to other students in selected units of the University of Minnesota.

Variables

The specific variables investigated in this assessment were the following: Preliminary Scholastic Aptitude Test (PSAT), which has verbal (PSATV) and math (PSATM) subtests; American College Test which includes

tests for English (ACTE), mathematics (ACTM), natural sciences (ACTNS), and social studies (ACTSS) and a comprehensive score (ACTC); cumulative grade point average (GPA); high school rank (HSR); the PSAT aptitude rating (PAR), a variable defined as the sum of the PSATV, PSATM and HSR; and total degree credits (DEGCR).

Student Description

In addition to data collected on these variables for College of Education undergraduates, data were also collected on students in the College of Liberal Arts, Institute of Technology, Agriculture, Nursing, Management, and Biological Sciences who were registered at least one quarter during the period Fall, 1981 through Summer Session, 1982. This was done so that a reference group would be available to which College of Education students could be compared.

Students in units admitting lower division students had to have at least 90 credits to be included in the study. Since PSAT and ACT data were available only for "new high school students", the study was further restricted to those who initially entered the University after high school, as opposed to transferring from another higher education institution.

The entire population consisted of 10,890 students, with 60% being males and 94% being caucasian. Since scores on all variables were not available for all students, smaller numbers were used for some comparisons. The smallest data set was 5755 for the ACTC scores.

In the companion study, a smaller data set was available on students registered during Spring, 1978. This population had 5979 students. These data were used to investigate whether or not students declined over time on these measures of aptitude and achievement.

Source of Data

All information was provided by the Student Data Retrieval Center of the Office of Admissions and Records, University of Minnesota. This center maintains a large amount of information in an easily accessible computerized data base.

Analysis of Data

The SPSS BREAKDOWN program was used to summarize the data for both studies. BREAKDOWN provides descriptive statistics for a total population and for subgroups which make up the population. In the second study, some comparisons between College of Education students and those in all other units were computed by hand.

Results

Study 1

As can be seen in Table 1, on the variables studied, College of Education students typically have the lowest average scores among the units compared. One factor not usually considered in the literature, which might explain the lower score, is that in certain instances the College admits some students to teaching majors where attributes other than academic aptitude are important considerations. For example, certain teaching areas require special psychomotor abilities or an aptitude for working with certain materials or machines. When only those education majors who plan to teach academic subjects, i.e., secondary academic and elementary majors are examined, they score on the variables studied as well as or better than their liberal arts counterparts. Since the University of Minnesota enrolls a fairly select group of students overall, this comparison is a good

indication in itself of academic strength among Education students. This strength is particularly apparent when the College's students are compared to other groups. In a recent Minnesota Department of Education publication (1980), scores were presented for 1980-81 college-bound juniors in Minnesota and in the nation as a whole. It was found that the Education students at the University scored higher on the three tests presented (PSATM, PSATV, and ACTC) than other students across the state of Minnesota and from the rest of the country.

Insert Table 1 here

As can be seen from Table 1, when one compares the Education academic majors as opposed to all education majors with the entire population of students across the University, they score higher on high school rank, GPA, and the ACTE. When the Education academic majors are compared with the several majors encompassed in the College of Liberal Arts, they score higher on six of the ten selected measures of achievement or aptitude.

While the results of this cross-sectional study reveal that students entering education in academic areas do not, in a relative sense, score poorly on selected measures of aptitude and achievement, they do not speak to the possibility of a decline in quality over time. The comparison of 1982 and 1978 students helps to determine if such a decline occurred.

Study 2

The primary question to be addressed in this second study is "did the quality of College of Education students (in terms of aptitude and achievement) decline over the four year period from 1978 to 1982?" In assessing change in student quality, the following variables were considered: ACTE, ACTN, ACTNS, ACTSS, ACTC, HSR, PSATV, PSATM, and GPA.

Table 1

Comparisons for 1982 on Selected

Achievement and Aptitude Scores*

TEST*	ENTIRE POPULATION	EDUCATION	ACADEMIC MAJORS	SECONDARY ACADEMIC MAJORS	CLA	HIGHEST UNIT*	LOWEST UNIT*
ACTE	20.86** (5758)	20.60 (418)	20.93 (244)	20.74 (156)	20.74 (2814)	21.86 BIO (159)	20.15 AGR (330)
ACTM	24.13 (5760)	21.73 (418)	22.35 (244)	22.67 (156)	22.30 (2815)	28.28 IT (1403)	21.73 ED (418)
ACTNS	23.05 (5758)	21.92 (418)	22.77 (244)	23.25 (156)	22.66 (2814)	24.62 BIO (159)	21.92 ED (418)
ACTSS	26.26 (5756)	24.18 (418)	24.40 (244)	24.65 (156)	25.21 (2813)	28.79 BIO (159)	24.18 ED (418)
ACTC	23.70 (5755)	22.25 (418)	22.76 (244)	22.98 (156)	22.85 (2811)	25.71 IT (1403)	22.25 ED (418)
PAR	181.22 (7253)	173.23 (434)	178.40 (240)	181.67 (127)	174.22 (3404)	194.73 IT (1802)	173.23 ED (434)
HSR	77.45 (10148)	76.37 (686)	77.92 (398)	77.44 (244)	73.26 (4954)	84.97 BIO (275)	73.26 CLA (4954)
PSATV	46.72 (7272)	43.90 (440)	45.88 (241)	47.09 (128)	46.52 (3466)	48.82 BIO (205)	43.90 ED (440)
PSATM	53.69 (7273)	49.35 (440)	50.33 (241)	51.77 (128)	51.12 (3467)	59.58 IT (1829)	49.35 ED (440)
GPA	2.93 (10889)	3.01 (720)	3.04 (405)	3.06 (249)	2.89 (5333)	3.17 N (194)	2.79 AGR (772)
DEGCR	152.21 (10890)	181.70 (720)	183.63 (405)	193.14 (249)	142.25 (5333)	181.70 ED (720)	142.25 CLA (5333)

*Legend

Test Name

ACTE	American College Test English
ACTM	American College Test Math
ACTNS	American College Test Natural Science
ACTSS	American College Test Social Science
ACTC	American College Test Composite
PAR	PSAT Aptitude Rating
HSR	High School Rank
PSATV	Standard Score on the Preliminary Scholastic Aptitude Test, Verbal
PSATM	Minnesota Score on the Preliminary Scholastic Aptitude Test, Math
GPA	Overall University of Minnesota Cumulative Grade Point Average
DEGCR	Total Degree Credits

Unit

AGR	Agriculture
BIO	Biological Sciences
CLA	Liberal Arts
ED	Education
IT	Institute of Technology
M	Management
N	Nursing

**Each cell contains two pieces of information. Numbers in row 1 are means and numbers in parentheses in row 2 refer to sample size.

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With respect to the nine variables being reviewed, as can be seen in Tables 2 and 3, College of Education students decreased in average score on seven of the nine between 1978 and 1982 and increased on two. Several of the changes, however, are exceedingly small. For example, the cumulative GPA of College of Education students was 3.03 in 1978 and declined to 3.01 in 1982. As another example, the 1978 ACTSS score for Education students was 24.09, and it increased to 24.18 in 1982. Also, it should be noted that the entire group, consisting of Education students and those from the selected units, decreased on all nine variables, with some of the decreases exceeding those for Education students considered alone. In no case are decreases for Education students large enough to explain the decrease for the entire group.

Insert Tables 2 and 3 here

Using a two-tail t-test, only one of the mean changes for Education students can be considered to be statistically significant and that is for PSATV, the verbal aptitude score. On that variable, Education students showed a decline from the 1978 average of 46.10 to 43.90 in 1982. This represents a shift of about one-qaurter of a standard deviation. If the PSATV scores can be considered to be normally distributed, then in 1978, 50% of the students would have scored above the mean of 46.10, whereas in 1982, only about 40% of the students would have fallen above that score. One way which this decrease can be placed in perspective is to examine the entire group studied, i.e., the group consisting of Education, College of Liberal Arts, Institute of Technology, Agriculture, Nursing, Management, and Biological Sciences students. There is also a statistically significant decline in PSATV scores for the entire group,

Table 2

Comparisons for 1978 on Selected

Achievement and Aptitude Scores*

TEST*	ENTIRE POPULATION	EDUCATION	ACADEMIC MAJORS	SECONDARY ACADEMIC MAJORS	CLA	HIGHEST UNIT*	LOWEST UNIT*
ACTE	21.06** (4469)	20.30 (382)	21.07 (206)	21.73 (109)	21.28 (2068)	22.31 N (93)	20.30 ED (382)
ACTM	24.73 (4469)	22.49 (382)	23.38 (206)	24.58 (109)	22.94 (2068)	28.88 IT (827)	22.49 ED (382)
ACTNS	24.05 (4468)	22.19 (382)	23.34 (206)	25.06 (109)	23.86 (2067)	25.28 BIO (184)	22.19 ED (382)
ACTSS	26.33 (4468)	24.09 (382)	24.98 (206)	26.72 (109)	25.38 (2067)	28.94 IT (827)	24.09 ED (382)
ACTC	24.17 (4465)	22.41 (382)	23.48 (206)	24.70 (109)	23.50 (2065)	26.12 IT (826)	22.41 ED (382)
PAR	187.36 (1889)	178.12 (120)	179.30 (87)	182.09 (32)	182.73 (841)	201.81 BIO (90)	178.12 ED (120)
HSR	78.07 (5594)	77.02 (447)	80.21 (253)	80.53 (127)	74.84 (2588)	87.91 N (116)	74.84 CLA (2588)
PSATV	48.60 (1932)	46.10 (126)	45.85 (91)	47.35 (34)	49.14 (870)	51.64 BIO (91)	46.10 ED (126)
PSATM	55.31 (1932)	50.04 (126)	51.09 (91)	52.32 (34)	53.17 (870)	60.88 IT (398)	50.04 ED (126)
GPA	2.98 (5979)	3.03 (470)	3.07 (266)	3.12 (136)	2.97 (2773)	3.32 N (123)	2.87 AGR (484)
DEGCR	139.24 (5979)	156.22 (470)	153.04 (266)	162.26 (136)	131.94 (2773)	156.22 ED (470)	131.94 CLA (2773)

*Legend

Test Name	
ACTE	American College Test English
ACTM	American College Test Math
ACTNS	American College Test Natural Science
ACTSS	American College Test Social Science
ACTC	American College Test Composite
PAR	PSAT Aptitude Rating
HRS	High School Rank
PSATV	Standard Score on the Preliminary Scholastic Aptitude Test, Verbal
PSATM	Minnesota Score on the Preliminary Scholastic Aptitude Test, Math
GPA	Overall University of Minnesota Cumulative Grade Point Average
DEGCR	Total Degree Credits

Unit	
AGR	Agriculture
BIO	Biological Science
CLA	Liberal Arts
ED	Education
IT	Institute of Technology
M	Management
N	Nursing

**Each cell contains two pieces of information. Numbers in row 1 are means and numbers in parentheses in row 2 refer to sample size.

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Table 3

Revised Comparisons for 1982 and 1978 on Selected

Achievement and Aptitude Scores*

TEST*	ENTIRE POPULATION	EDUCATION	ACADEMIC MAJORS	SECONDARY ACADEMIC MAJORS	CLA	HIGHEST UNIT*	LOWEST UNIT*
ACTE	(-)	(+)	(-)	(-)	(-)	different unit	different unit
ACTM	(-)	(-)	(-)	(-)	(-)	(-) IT	(-) ED
ACTNS	(-)	(-)	(-)	(-)	(-)	(-) BIO	(-) ED
ACTSS	(-)*	(+)*	(-)	(-)	(-)	different unit	(-)*ED
ACTC	(-)	(-)	(-)	(-)	(-)	(-) IT	(-) ED
PAR	(-)	(-)	(-)	(-)	(-)	different unit	(-) ED
HSR	(-)	(-)	(-)	(-)	(-)	different unit	(-) CLA
PSATV	(-)	(-)	(-)	(-)	(-)	(-) BIO	(-) ED
PSATM	(-)	(-)	(-)	(-)	(-)	(-) IT	(-) ED
GPA	(-)*	(-)*	(-)*	(-)*	(-)*	(-) N	(-)* AGR
DEGCR	(+)	(+)	(+)	(+)	(+)	(+) ED	(+) CLA

*Legend

Test Name

ACTE	American College Test English
ACTM	American College Test Math
ACTNS	American College Test Natural Science
ACTSS	American College Test Social Science
ACTC	American College Test Composite
PAR	PSAT Aptitude Rating
HSR	High School Rank
PSATV	Standard Score on the Preliminary Scholastic Aptitude Test, Verbal
PSATM	Minnesota Score on the Preliminary Scholastic Aptitude Test, Math
GPA	Overall University of Minnesota Cumulative Grade Point Average
DEGCR	Total Degree Credits

Unit

AGR	Agriculture
BIO	Biological Science
CLA	Liberal Arts
ED	Education
IT	Institute of Technology
M	Management
N	Nursing

*Note: The following decision rules were applied in making the comparisons:
If the difference between the years is

(1) $\geq 1/10$, use (+) or (-)
(2) $< 1/10$, use (+)* or (-)*

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from 48.60 in 1978 to 46.72 in 1982. Whatever accounts for the drop in PSATV scores, it is not something unique to Education students, since it is clear from these data that Education students' scores changed in a manner similar to those of the other units.

All things considered, the answer to the question posed above concerning a decline in the quality of Education students should most likely be answered, "No, quality has not declined." The College of Education's students do not appear to be significantly different in 1982 from what they were in 1978 with the exception of one variable, namely verbal aptitude as assessed by PSATV. Further, since this decline is also shared by the group to which Education students were compared, this change in performance on an aptitude measure is most likely explained by some factor which is not unique to Education students. In fact, the slight changes between 1978 and 1982 can just as easily be explained by some small lack of comparability between the data sets resulting from the fact that the 1978 data only include students enrolled spring quarter, i.e, students who have succeeded for a longer period in the academic environment.

Educational/Scientific Importance

There is a tendency to over-generalize from limited samples and data sets about the aptitude of teachers as well as a tendency to aggregate scores for types of education majors or teachers regardless of different aptitudes associated with specific teaching roles. Thus, further study of teacher aptitude is needed which considers such factors as (1) differences in types of teacher education institutions (e.g., large multiversity vs. comprehensive colleges), (2) differences across various majors in education, (3) differences across college majors in the same institution

(i.e., how do education majors compare with local and regional as well as national peer groups), and (4) a broad array of indices of aptitude and achievement (including high school rank, and accumulated college grade point averages). This study addresses each of the above four concerns and provides an analysis of teacher aptitude and achievement over time at a large doctoral-granting college of education. This study provides further perspective for assessing the quality of teacher candidates.

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Author Abstract

There have been sharp declines reported in the standardized test scores of prospective teachers across the country. The data reported, however, tend to be either regional in nature or national aggregates. This study examined indices of prospective teacher general achievement and aptitude in a single college of education in a doctoral-granting multiversity setting. These scores were examined over time, against majors in other professional schools in the same institution as well as across different education majors. The specific variables investigated included subtests on the Preliminary Scholastic Aptitude Test (PSAT), subtests on the American College Test (ACT), cumulative grade point average (GPA), and high school rank (HSR).

Education students at this university on the average scored higher on the standardized tests than other students in general across the state and country. When the total education students are compared with other majors in this institution, they typically scored the lowest. However, when only academic education majors were compared with other majors, they tended to score as high or higher. The only statistically significant difference found over time was on the verbal aptitude score of the PSAT, a slight decrease shared by all majors. This study suggests further investigation of institutional context differences.